TAPE DRIVE ATTACHMENT TO SUN SPARC WORKSTATIONS (Solaris 2.4 or higher)

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This document describes the procedure for attaching Overland Data tape drives to the Sun Microsystems Sparcstation family of products running under Solaris 2.4 or higher.

This Application Note should NOT be used under Solaris 2.3 or earlier releases.

1. Verify that the unit has a SCSI interface compatible with the SCSI controller installed in the workstation (i.e., low voltage differential, single-ended or high voltage differential).

2. Determine available SCSI IDs on the workstation. If this information is not known, halt the Sun system and at the `ok` prompt type `probe-scsi` or `probe-scsi-all` to display the addresses of devices currently connected to the system (refer to your Sun system documentation if necessary). Each device on the SCSI bus must have a unique SCSI ID. If necessary, refer to the appropriate User & Installation Manual for instructions on setting the SCSI ID of the tape drive.

3. Using an appropriate text editor (like *vi*) edit the file */kernel/drv/st.conf.*

It is important to use the exact spelling, case, and punctuation when entering the information into the st.conf file (for example, there must be five spaces between DEC and DLT2000 when entering the string for the DLT2000XT).

It may be helpful if the user reads the *man* pages on *st* prior to editing any files.

Add the following in *st.conf*:

```
tape-config-list=
"SEAGATE ULTRIUM06242-XXX",”Overland LTO","lto-data",
“HP      Ultrium 1”,”HP Ultrium 1”, “ULTRIUM-1”,
“HP      Ultrium 2”,”HP Ultrium 2”, “ULTRIUM-2”,
"QUANTUM SuperDLT1","Overland SuperDLT1","sdlt1-data",
"QUANTUM SDLT 320","Overland SDLT 320","sdlt320-data",
"SONY    SDX-700C","Sony AIT3 8mm","SONY_AIT",
"SONY    SDX-500C","Sony AIT2 8mm","SONY_AIT",
"SONY    SDX-300C","Sony AIT1 8mm","SONY_AIT",
"QUANTUM DLT8000","Overland DLT8000","dlt8000-data",
"QUANTUM DLT7000","Overland DLT7000","dlt7000-data",
"Quantum DLT4000","Overland DLT4000","dlt4000-data",
"DEC     DLT2000","Overland DLT2000XT","dlt2000xt-data",
"OVERLANDL490E","Overland L490E","l490e-data",
"OVERLANDT490E","Overland T490E","l490e-data",
"OVERLAND 5622","Overland 5622/5624","ninetrk-data",
"OVERLANDM995","Overland M995","ninetrk-data";

lto-data=       1,0x36,0,0x1d639,4,0x00,0x00,0x00,0x00,0;
ULTRIUM-1 =     1,0x36,0,0x1d639,4,0x00,0x00,0x00,0x40,3;
ULTRIUM-2 =     1,0x36,0,0x1d639,4,0x00,0x00,0x00,0x42,3;
sdlt320-data =  1,0x38,0,0x1D639,4,0x90,0x91,0x92,0x93,3;
sdlt1-data=     1,0x36,0,0x1d639,4,0x00,0x00,0x00,0x00,0;
SONY_AIT=       1,0x36,0,0x1d679,4,0x00,0x00,0x00,0x00,0;
dlt8000-data=   1,0x36,0,0xd619,4,0x84,0x85,0x88,0x89,3;
dlt7000-data=   1,0x36,0,0xd619,4,0x82,0x83,0x84,0x85,3;
dlt4000-data=   1,0x36,0,0xd619,4,0x80,0x81,0x82,0x83,3;
dlt2000xt-data= 1,0x36,0,0xd619,4,0x17,0x18,0x80,0x81,3;
l490e-data=     1,0x36,0,0x4619,4,0x90,0x91,0x92,0x93,3;
ninetrk-data =  1,0x33,0,0x443d,4,0x02,0x02,0x03,0x03,3;
```

4. After editing and saving the new st.conf file, shut down the system and reboot with the following command:

>*boot -rv*

The switch *r* forces the compiling of the kernel and the switch *v* is verbose. As the system boots, it will recompile the kernel and create the special files in */dev* to communicate with the tape drive. Switch *v* causes the SCSI targets to be displayed during the boot. It will display whatever value is entered in the second string of the associated *tape-config-list* entry defined in step 3. After the system has finished booting, you can use the UNIX command `dmesg` to determine if the tape device has been properly recognized.

5. Special files used to communicate with the tape drive will be created in the /dev/rmt directory. After completing steps 1-4 and logging on to the system, determine the /dev/rmt device files associated with the tape drive by typing the following at a UNIX prompt:

```
# ls -l /dev/rmt/?
```

A display similar to following will be shown:

```
/dev/rmt/0 -> ../~path~/st4,0
/dev/rmt/1 -> ../~path~/st5,0
```

In this example /dev/rmt/0 refers to the tape drive using SCSI ID 4 and /dev/rmt/1 refers to the tape drive using SCSI ID 5.

6. A series of special files are created for each tape drive to modify the operation of the st tape driver. To display the set of special files associated with a particular device, type the following at a UNIX prompt:

```
# ls /dev/rmt/0*
```

A list of special files should be displayed:

/dev/rmt/0 /dev/rmt/0cbn /dev/rmt/0hn /dev/rmt/0m /dev/rmt/0u
/dev/rmt/0b /dev/rmt/0cn /dev/rmt/0l /dev/rmt/0mb /dev/rmt/0ub
/dev/rmt/0bn /dev/rmt/0h /dev/rmt/0lb /dev/rmt/0mbn /dev/rmt/0ubn
/dev/rmt/0c /dev/rmt/0hb /dev/rmt/0lbn /dev/rmt/0mn /dev/rmt/0un
/dev/rmt/0cb /dev/rmt/0hbn /dev/rmt/0ln /dev/rmt/0n

Using the following syntax:

/dev/rmt/[0- 127][l,m,h,u,c][b][n]

- where l,m,h,u,c specifies the density (low, medium, high, ultra/compressed),
  b specifies the optional BSD behavior (see mtio(7)),
  n specifies the optional no rewind behavior.

For example, /dev/rmt/0lbn
specifies unit 0, low density, BSD behavior, and no rewind.

7. The following tables define the relationship of the density codes to the device files (l,m,h,u,c) for the various Overland tape drives configured in step 3. These examples assume that the primary device file is /dev/rmt/0

Seagate LTO Ultrium (rewind, no BSD behavior)

Device File	Density Code	Format Selected
/dev/rmt/0l	0x00	100 GB uncompressed (LTO Ultrium-1 cartridge)
/dev/rmt/0m	0x00	100 GB uncompressed (LTO Ultrium-1 cartridge)
/dev/rmt/0h	0x00	100 GB uncompressed (LTO Ultrium-1 cartridge)
/dev/rmt/0u	0x00	200 GB compressed (LTO Ultrium-1 cartridge)
/dev/rmt/0c	0x00	200 GB compressed (LTO Ultrium-1 cartridge)

HP LTO Ultrium-1 (rewind, no BSD behavior)

Device File	Density Code	Format Selected
/dev/rmt/0l	0x00	100 GB uncompressed (LTO Ultrium-1 cartridge)
/dev/rmt/0m	0x00	100 GB uncompressed (LTO Ultrium-1 cartridge)
/dev/rmt/0h	0x00	100 GB uncompressed (LTO Ultrium-1 cartridge)
/dev/rmt/0u	0x40	200 GB compressed (LTO Ultrium-1 cartridge)
/dev/rmt/0c	0x40	200 GB compressed (LTO Ultrium-1 cartridge)

HP LTO Ultrium-2 (rewind, no BSD behavior)

Device File	Density Code	Format Selected
/dev/rmt/0l	0x00	200 GB uncompressed (LTO Ultrium-2 cartridge)
/dev/rmt/0m	0x00	200 GB uncompressed (LTO Ultrium-2 cartridge)
/dev/rmt/0h	0x00	200 GB uncompressed (LTO Ultrium-2 cartridge)
/dev/rmt/0u	0x42	400 GB compressed (LTO Ultrium-2 cartridge)
/dev/rmt/0c	0x42	400 GB compressed (LTO Ultrium-2 cartridge)

SuperDLT1 (rewind, no BSD behavior)

Device File	Density Code	Format Selected
/dev/rmt/0l	0x00	110 GB uncompressed (Super DLTtape I cartridge)
/dev/rmt/0m	0x00	110 GB uncompressed (Super DLTtape I cartridge)
/dev/rmt/0h	0x00	110 GB uncompressed (Super DLTtape I cartridge)
/dev/rmt/0u	0x00	220 GB compressed (Super DLTtape I cartridge)
/dev/rmt/0c	0x00	220 GB compressed (Super DLTtape I cartridge)

SDLT320 (rewind, no BSD behavior)

Device File	Density Code	Format Selected
/dev/rmt/0l	0x90	110 GB uncompressed (Super DLTtape I cartridge)
/dev/rmt/0m	0x91	220 GB compressed (Super DLTtape I cartridge)
/dev/rmt/0h	0x92	160 GB uncompressed (Super DLTtape I cartridge)
/dev/rmt/0u	0x93	320 GB compressed (Super DLTtape I cartridge)
/dev/rmt/0c	0x93	320 GB compressed (Super DLTtape I cartridge)

SDX-700C (rewind, no BSD behavior)

Device File	Density Code	Format Selected
/dev/rmt/0l	0x00	AIT-3 uncompressed (AIT-3 cassette) or AIT-1 or AIT-2 uncompressed (AIT-1 or AIT-2 cassette)
/dev/rmt/0m	0x00	AIT-3 uncompressed (AIT-3 cassette) or

		AIT-1 or AIT-2 uncompressed (AIT-1 or AIT-2 cassette)
/dev/rmt/0h	0x00	AIT-3 uncompressed (AIT-3 cassette) or AIT-1 or AIT-2 uncompressed (AIT-1 or AIT-2 cassette)
/dev/rmt/0u	0x00	AIT-3 compressed (AIT-3 cassette) or AIT-1 or AIT-2 compressed (AIT-1 or AIT-2 cassette)
/dev/rmt/0c	0x00	AIT-3 compressed (AIT-3 cassette) or AIT-1 or AIT-2 compressed (AIT-1 or AIT-2 cassette)

SDX-500C (rewind, no BSD behavior)

Device File	Density Code	Format Selected
/dev/rmt/0l	0x00	AIT-2 uncompressed (AIT-2 cassette) or AIT-1 uncompressed (AIT-1 cassette)
/dev/rmt/0m	0x00	AIT-2 uncompressed (AIT-2 cassette) or AIT-1 uncompressed (AIT-1 cassette)
/dev/rmt/0h	0x00	AIT-2 uncompressed (AIT-2 cassette) or AIT-1 uncompressed (AIT-1 cassette)
/dev/rmt/0u	0x00	AIT-2 compressed (AIT-2 cassette) or AIT-1 compressed (AIT-1 cassette)
/dev/rmt/0c	0x00	AIT-2 compressed (AIT-2 cassette) or AIT-1 compressed (AIT-1 cassette)

SDX-300C (rewind, no BSD behavior)

Device File	Density Code	Format Selected
/dev/rmt/0l	0x00	AIT-1 uncompressed (AIT-1 cassette)
/dev/rmt/0m	0x00	AIT-1 uncompressed (AIT-1 cassette)
/dev/rmt/0h	0x00	AIT-1 uncompressed (AIT-1 cassette)
/dev/rmt/0u	0x00	AIT-1 compressed (AIT-1 cassette)
/dev/rmt/0c	0x00	AIT-1 compressed (AIT-1 cassette)

DLT8000 (rewind, no BSD behavior)

Device File	Density Code	Format Selected
/dev/rmt/0l	0x84	35 GB uncompressed (DLTtape IV cartridge)
/dev/rmt/0m	0x85	70 GB compressed (DLTtape IV cartridge)
/dev/rmt/0h	0x88	40 GB uncompressed (DLTtape IV cartridge)
/dev/rmt/0u	0x89	80 GB compressed (DLTtape IV cartridge)
/dev/rmt/0c	0x89	80 GB compressed (DLTtape IV cartridge)

DLT7000 (rewind, no BSD behavior)

Device File	Density Code	Format Selected
/dev/rmt/0l	0x82	20 GB uncompressed (DLTtape IV cartridge)
/dev/rmt/0m	0x83	40 GB compressed (DLTtape IV cartridge)
/dev/rmt/0h	0x84	35 GB uncompressed (DLTtape IV cartridge)
/dev/rmt/0u	0x85	70 GB compressed (DLTtape IV cartridge)
/dev/rmt/0c	0x85	70 GB compressed (DLTtape IV cartridge)

DLT4000 (rewind, no BSD behavior)

Device File	Density Code	Format Selected
/dev/rmt/0l	0x80	10/15 GB uncompressed (DLTtape III/IIIXT cartridge)
/dev/rmt/0m	0x81	20/30 GB compressed (DLTtape III/IIIXT cartridge)
/dev/rmt/0h	0x82	20 GB uncompressed (DLTtape IV cartridge)
/dev/rmt/0u	0x83	40 GB compressed (DLTtape IV cartridge)
/dev/rmt/0c	0x83	40 GB compressed (DLTtape IV cartridge)

DLT2000XT (rewind, no BSD behavior)

Device File	Density Code	Format Selected
/dev/rmt/0l	0x17	2.6 GB uncompressed (DLTtape III cartridge)
/dev/rmt/0m	0x18	6.0 GB compressed (DLTtape III cartridge)
/dev/rmt/0h	0x80	10/15 GB uncompressed (DLTtape III/IIIXT cartridge)
/dev/rmt/0u	0x81	20/30 GB compressed (DLTtape III/IIIXT cartridge)
/dev/rmt/0c	0x81	20/30 GB compressed (DLTtape III/IIIXT cartridge)

L490E or T490E (rewind, no BSD behavior)

Device File	Density Code	Format Selected
/dev/rmt/0l	0x90	3480 format, 18-track uncompressed
/dev/rmt/0m	0x91	3490 format, 18-track compressed
/dev/rmt/0h	0x92	3490E format, 36-track uncompressed
/dev/rmt/0u	0x93	3490E format, 36-track compressed
/dev/rmt/0c	0x93	3490E format, 36-track compressed

Note: To use these density code values with the L490E or T490E, Config Option 63 must be set to VU DENSITY. Refer to the L490E or T490E User and Installation manual for information on setting configuration options.

5622/5624 (rewind, no BSD behavior)

Device File	Density Code	Format Selected
/dev/rmt/0l	0x02	1600 bpi
/dev/rmt/0m	0x02	1600 bpi
/dev/rmt/0h	0x03	6250 bpi
/dev/rmt/0u	0x03	6250 bpi
/dev/rmt/0c	0x03	6250 bpi

M995 (rewind, no BSD behavior)

Device File	Density Code	Format Selected
/dev/rmt/0l	0x02	1600 bpi
/dev/rmt/0m	0x02	1600 bpi
/dev/rmt/0h	0x03	6250 bpi
/dev/rmt/0u	0x03	6250 bpi
/dev/rmt/0c	0x03	6250 bpi